

ABSTRACT OF THE DISCLOSURE

In a magnetic resonance tomography apparatus employing a FISP pulse sequence, the pulse sequence is repeated with a repetition time T_R with different phase-coding gradient directions and with an alternating operational sign of the flip angle α . The gradient pulse trains are thereby completely balanced. A phase increment $\Delta\phi=\beta$ is generated in addition to the alternating operational sign of the flip angle α between successive excitation pulses, so that the steady state signals for a first and a second spin ensemble optionally have either identical or reversed signal polarities. A first dataset on the basis of identical signal polarities and a second dataset on the basis of reversed signal polarities are obtained by means of the free selection of the mutual signal polarities. A pure image of the first and the second spin ensembles is thus obtained by the addition and/or subtraction of the first and second datasets.